Air tightness and strength tests for Furanflex exhaust air ducts

Requested by: Hormex Oy

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Order 6.2.2008 / C.G. Pettersson

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Task

Air tightness and strength tests for Furanflex exhaust air ducts

Sample

Hormex Oy delivered the following ducts (Furanflex inner surface inside the circular sheet metal ducts):

Duct Ø 160 + T-piece Ø 160/160 + cap end Ø 160 (2 pcs)
Duct Ø 315 + T-piece Ø 315/160 + cap end Ø 315 (2 pcs)
Duct Ø 400 + T-piece Ø 400/250 + cap end Ø 400 (2 pcs)
Duct Ø 500 + T-piece Ø 500/250 + cap end Ø 500 (2 pcs)

The samples were received 5.5.2008.
Measurements were carried out 8.5.2008

Furanflex inner surface inside the duct is glass fibre reinforced furan and fenol mass, which is hardened by curing agent. Manufacturer of the Furanflex inner surface material is Kompozitor Plastics Developing Co. Ltd. 2220-Vecsés, Széchenyi út 60, Hungary.

Test methods

Measurements were carried out according to standard SFS-EN 12237 /1/.

Exhaust air ducts used in tests are presented in Appendix 1.

The instruments used in the measurements are presented in Appendix 3.

Results

Measurement results are presented in Appendix 2.

For the classification of the air leakage factor of the test duct, the maximum allowed air leakage factors are presented in the table 1. Air leakage factors are calculated according to the standard SFS-EN 12237 /1/.

When the allowed leakage factors were calculated, the duct surface area of the test duct was calculated according to the standard SFS-EN 14239 /2/.

Furanflex exhaust air ducts met the requirements of the air tightness class D for both positive and negative test pressure. Furanflex exhaust air ducts met the requirements of the strength tests when the pressure inside the duct was +2000/-1000 Pa. The strength tests did not affect the tightness class of the duct.

The results are only valid for the tested items.

References

/1/ SFS-EN 12237:2003. Ventilations for buildings. Strength and leakage of circular sheet metal ducts.

/2/ SFS-EN 14239:2004. Ventilations for buildings. Ductwork. Measurement of ductwork surface area.

Espoo, 19.5.2008

Mikko Nyman
Senior Research Scientist

Kyösti Ovaska
Research Scientist

Appendices 3

Distribution

Customer	Original
VTT	Original

Ductwork: Furanflex exhaust air duct

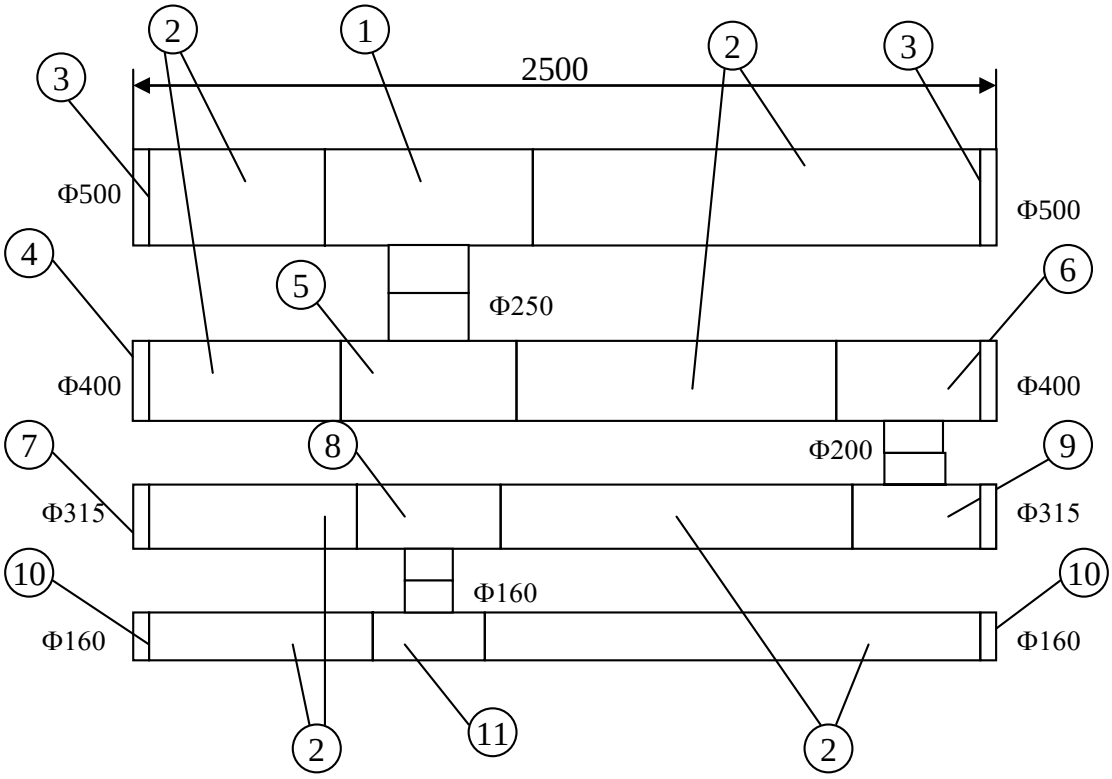
Installation of ductwork

SFS-EN 14239, SFS-EN 12237

Duct surface area A: 10,8 m^2

Total joint length L: 12,5 m

The ratio L/A: 1,15 m^{-1}



1) T-piece 500/250
2) Furanflex exhaust air duct
3) Connector + cap end 500
4) Connector + cap end 400
5) T-piece 400/250
6) T-piece 400/200 + cap end 400
7) Connector + cap end 315
8) T-piece 315/160
9) T-piece 315/200 + cap end 315
10) Connector + cap end 160
11) T-piece 160/160

Ductwork: Furanflex exhaust air duct

Tightness of ductwork

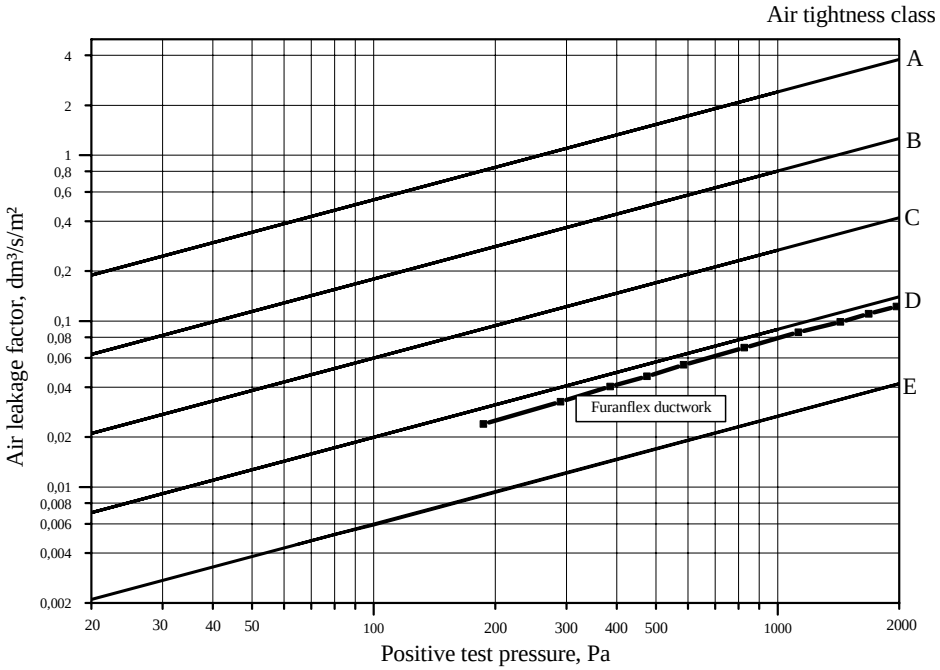
Air tightness class

SFS-EN 12237

Duct surface area A: 10,8 m^2

Air density: 1,20 kg/m^3

Ductwork meets the requirements of the air tightness class D for positive pressure



Measu-rement no	Positive test pressure	Air leakage factor	Maximun air leakage factors in different air tightness classes				
			E	D	C	B	A
	p Pa	q_{VlA} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$
1	187	0,024	0,009	0,030	0,090	0,270	0,809
2	290	0,033	0,012	0,040	0,120	0,359	1,076
3	385	0,040	0,014	0,048	0,144	0,431	1,294
4	475	0,047	0,016	0,055	0,165	0,494	1,483
5	585	0,054	0,019	0,063	0,189	0,566	1,698
6	827	0,069	0,024	0,079	0,236	0,709	2,127
7	1126	0,086	0,029	0,096	0,289	0,866	2,599
8	1430	0,099	0,034	0,112	0,337	1,012	3,036
9	1680	0,111	0,037	0,125	0,375	1,124	3,371
10	1970	0,122	0,042	0,138	0,415	1,246	3,739

Ductwork: Furanflex exhaust air duct

Tightness of ductwork

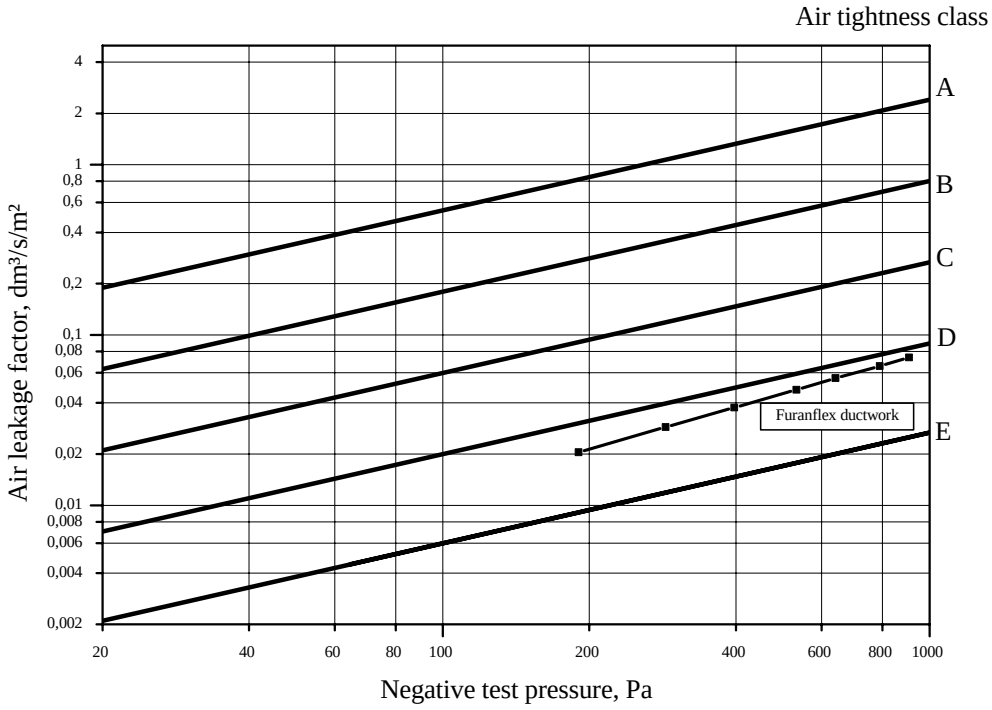
Air tightness class

SFS-EN 12237

Duct surface area A: 10,8 m^2

Air density: 1,20 kg/m^3

Ductwork meets the requirements of the air tightness class D for negative pressure



Measure-ment no	Negative test pressure	Air leakage factor	Maximun air leakage factors in different air tightness classes				
			E	D	C	B	A
	p Pa	q_{VlA} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$	q_{VlAmax} $dm^3/s/m^2$
1	190	0,020	0,009	0,030	0,091	0,273	0,818
2	287	0,028	0,012	0,040	0,119	0,356	1,069
3	397	0,038	0,015	0,049	0,147	0,440	1,320
4	533	0,048	0,018	0,059	0,178	0,533	1,599
5	641	0,056	0,020	0,067	0,200	0,601	1,802
6	790	0,066	0,023	0,076	0,229	0,688	2,065
7	908	0,073	0,025	0,084	0,251	0,753	2,260

MEASURING INSTRUMENTS

Orifice plate duct 650/LVI6, calibrated 1.12.1995

Manometer Alnor MP6KS nro 8765, calibrated 11.7.2007

Manometer Mikor TT470S nro 7867, calibrated 11.7.2007

Manometer Mikor TT470S nro 7868, calibrated 11.7.2007

Thermometer Comark 3002 nro 32237, calibrated 11.7.2007

Barometer Druck DPI 145 sn.0980/00-01, calibrated 18.3.2008

Hygrometer Velocicalc Plus TSI 8388-M-F nro 980200333, calibrated 28.4.2008